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ABSTRACT

The purpose of this study was to obtain information that will make it possible to plan for the development of occupational competency assessment procedures in a rational manner, based on the expressed needs of occupational educators and employers. Eight fields were selected for scrutiny: Accounting, Agribusiness, Data Processing, Day Care, Electronics Technology, Management, Police Science, and Secretarial Science. Specifically the study attempted to: (1) verify and delineate the existence of needs for measurement and evaluation services appropriate for community colleges and other postsecondary institutions concerned with occupational training; (2) ascertain the extent to which assessment needs are being met with existing evaluation measures; (3) specify the areas in which there are unmet needs for evaluation services; (4) develop suitable approaches for devising the needed measures; (5) evaluate the process for the entire project to determine specifically if it is a feasible model for developing measurement and evaluation services in other areas of postsecondary education. (Author/RC)

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# PLANNING THE DEVELOPMENT OF MEASUREMENT AND EVALUATION SERVICES FOR USE IN OCCUPATIONAL PROGRAMS AT POSTSECONDARY INSTITUTIONS

Amiel T. Sharon

July 1974
EDUCATIONAL TESTING SERVICE
PRINCETON, NEW JERSEY

# PLANNING THE DEVELOPMENT OF MEASUREMENT AND EVALUATION SERVICES FOR USE IN OCCUPATIONAL PROGRAMS AT POSTSECONDARY INSTITUTIONS

FINAL REPORT

Submitted to the

Fund for the Improvement of Postsecondary Education

by

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July 1974

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## SUMMARY

The objective of this study was to explore the needs of post-secondary institutions for instruments and procedures to be used in assessing occupational competency. Overall guidance and policy direction was given to the project by an advisory committee of distinguished occupational educators representing a wide range of viewpoints. Exploration and data collection was conducted by task force groups of experts in eight occupational fields. Staff support was provided by measurement specialists from ETS, CEEB, and WICHE.

The focus of the study was primarily on the need to translate work-related experience into degree or certificate credit at post-secondary institutions. Eight occupational fields were selected for scrutiny: Accounting, Agribusiness, Data Processing, Day Care, Electronics Technology, Management, Police Science, and Secretarial Science. A task force delineated each field, identified the measurement needs of individuals and institutions, identified and evaluated available instruments and procedures, determined the new instruments and procedures that need to be developed, and suggested ways to implement new occupational assessment programs.

Although a need for occupational competency measures was identified in all of the fields explored, the clearest needs were in Data Processing, Electronics Technology, Police Science, and Secretarial Science. There are many non-degreed individuals in these

fields who have acquired job proficiency and are likely to desire credit and placement in pursuit of higher education especially where the possession of a degree may have implications for career advancement. Many colleges are currently granting credit for occupational competency and more would probably do so if suitable measures for assessing the knowledge and skill gained through work experience were available. College representatives have indicated that to be optimally useful, such measures should parallel the curriculum so that credit can be granted on a course by course basis. Most of the standardized occupational proficiency examinations used for this purpose are at an inappropriate level, are not structured to fit the curriculum, and cover dated material. There is a need to develop and experiment with new assessment techniques including written objective examinations, performance tests, situational exercises and self-assessment inventories in order to measure the relevant cognitive, psychomotor, and affective competencies acquired on the job. The Advisory Committee recommended that occupational assessment programs be developed under the sponsorship of a consortia consisting of postsecondary institutions and professional associations. The actual development of assessment procedures and operation of the programs should be the responsibility of professional testing agencies working under the policy direction of the consortia.

# INTRODUCTION

Postsecondary institutions play a vital role in providing skill training and education to individuals who desire to engage in occupations which may not require the traditional baccalaureate degree. Among these institutions are junior or community colleges, technical institutes, corporate schools, and a variety of other public and private training institutions. These institutions are an important link between students and employers as they have assumed a considerable amount of responsibility for the preparation of individuals for the world of work.

The recent emergence and rapid growth of occupational training in postsecondary education has given rise to a number of critical problems relating to guidance, placement, and evaluation of students who have acquired their training and experience in a non-traditional manner. Young men and women wishing to continue their education upon leaving the armed services often find that they are unable to get recognition for the training they received under military auspices. Adults who have received on-the-job training in business and industry also encounter difficulty translating the knowledge and experience acquired in this way into academic credit--or into some form of advanced academic placement.

Many occupational educators have recognized this problem and have sought the help of various educational research and service

agencies in developing appropriate evaluation instruments and techniques. While many educators were primarily interested in procedures that would be useful in guidance and placement, others were concerned with evaluating the outcomes of instruction; still others expressed the need for tests and procedures that could be used for assessing the trade competency of prospective teachers in occupational education. Although all of these are probably legitimate expressions of need, and although all are to some extent interrelated, how is it to be determined which area or areas should have priority, which can be dealt with concurrently, and which will require distinct and separate approaches?

The purpose of this study was to obtain information that will make it possible to plan for the development of occupational competency assessment procedures in a rational manner, based on the expressed needs of occupational educators and employers. Specifically, the study attempted to:

1. verify and delineate the existence of needs for measurement and evaluation services appropriate for community colleges and other postsecondary institutions concerned with occupational training;
2. ascertain the extent to which assessment needs are being met with existing evaluation measures;
3. specify the areas in which there are unmet needs for evaluation services;

4. develop suitable approaches for devising the needed measures;
5. evaluate the process for the entire project to determine specifically if it is a feasible model for developing measurement and evaluation services in other areas of postsecondary education.

## PROCEDURE

*Advisory Committee*

The planning process used in this study involved a cooperative effort by teams of experts in various occupational areas to explore the needs and approaches to development of occupational competency measures in terms of the questions raised in the previous section. Overall guidance and policy direction was given to the project by an Advisory Committee of seven occupational educators and measurement specialists who represented a wide range of viewpoints. (See Appendix A for the names and affiliations of the Advisory Committee members.)

The Advisory Committee's function was to help implement the broad goals of the project by posing a set of specific questions to be explored, providing direction for the development of occupational competency measures, and identifying specific occupational fields for in-depth study that would most likely profit from the introduction of standardized assessment procedures.

The committee held two meetings; the first on November 15-16, 1973 and the second on May 30-31, 1974. At the first meeting the committee set the stage for the planning process by focusing attention on the objectives of occupational competency assessment and by advising on the occupational fields that should be explored. At its second meeting, the committee received the input and rec-

ommendations of a task force of experts in each of eight occupational fields. The committee synthesized the information obtained from the task forces, drew conclusions concerning assessment needs, identified priority areas for development of job proficiency measures, and advised on procedures for the implementation of the task forces' recommendations.

*Task Forces*

A task force of five experts was convened for each of the occupational fields selected by the Advisory Committee. The Advisory Committee suggested that the members of each task force represent a different viewpoint or interest and hold the following kinds of positions: (1) academic trainer, (2) non-academic trainer, (3) current practitioner, (4) a representative of a non-degree granting institution, e.g. employer, and (5) a member of a government agency or professional association. In general, the composition of the eight task forces matched the Advisory Committee's specifications. (See Appendix B for the names and affiliations of the task force members.)

The role of the task forces was to respond to the questions posed by the Advisory Committee by discussion, research, and action-oriented suggestions regarding the kinds of instruments and services which met the assessment needs and the best ways of mobilizing support and resources for developmental activities that would follow the project.

Each task force held two, two-day meetings. The initial meeting was used to clarify, organize, and develop a strategy for researching and responding to the questions raised by the Advisory Committee. Some of the task force members received specific assignments for research or have directed the Project's staff to carry out such research. At the second meeting the task forces formulated recommendations to the Advisory Committee and suggested ways of implementing these recommendations.

Staff support for the task forces and the Advisory Committee was provided by the ETS, CEEB, and WICHE personnel. (See Appendix C for the names and affiliations of the staff.) Although overall fiscal and management responsibility rested with ETS, each organization participated equally in the Project by assuming primary responsibility for the operation of three committees.

## RESULTS

### *Objectives of Occupational Competency Assessment*

The Advisory Committee discussed at length the specific objectives for which occupational competency measures would be employed. Some of the possible objectives such measures might serve are as follows:

1. provide degree credit by translating vocational experiences into units or categories that parallel the academic curriculum;
2. facilitate appropriate placement or advanced standing in the curriculum;
3. identify strong and weak occupational skills;
4. document the trainee's completion of various stages in an occupational program;
5. determine the trainee's completion of an occupational program;
6. evaluate the effectiveness of an occupational program;
7. serve as an alternative accrediting device;
8. improve mobility across vocations by assessing basic skills;
9. select prospective vocational teachers for training programs;
10. license or certify vocational teachers;
11. evaluate vocational teachers for the purpose of merit rating;
12. select workers.

The Advisory Committee felt the need to limit the objectives of occupational competency assessment to be explored in this study in order to make the work of the task forces manageable. Also, it appeared clear that a single assessment instrument could not serve all or even most of the foregoing objectives. The Committee subsequently recommended that the project should focus primarily on the *need to translate work-related experience into degree or certificate credit* rather than on the other possible purposes of competency testing. It was recognized, however, that examinations or other instruments which were used for granting academic credit could serve multiple purposes.

*Selection of Occupational Fields*

One of the functions of the Advisory Committee was to select a number of occupational fields which would be explored in detail by the task forces. A number of criteria were considered by the Committee in their selection strategy. The major criteria used were the number of students currently enrolled in the curricula of community and junior colleges and the number of persons currently employed in the profession or likely to be employed in the future. The criterion of "social significance" was considered in relation to various emerging paraprofessions such as legal aides and psychiatric technicians. The Committee believed, however, that it would be inappropriate to explore the occupations that met this criterion because the number of people employed in them is currently small and there are few, if any, college curricula to train them.

In the process of selecting target fields for occupational competency assessment, the Advisory Committee considered the results of several surveys:

- A 1972 CEEB-WICHE survey of 225 colleges in 11 states requested administrators to indicate the fields of greatest need for occupational competency measures. The five most frequently mentioned areas were: general secretarial services, auto mechanics and related fields, industrial electronics, trade and industrial occupations, business and technical services.

- An informal survey of the deans of junior colleges conducted by an Advisory Committee member in one of the larger state systems in the nation (Illinois) indicated that the most frequently expressed needs were in the fields of police science, supervision, secretarial studies, electronics, and automotive mechanics.

- Information provided by the American Association of Community and Junior Colleges indicated that the occupational areas of highest enrollment at two-year colleges were cost accounting and bookkeeping, electronics technology, and management.

In addition to considering the frequency of course offerings in a particular field the Advisory Committee believed that the occupations to be explored should be as diverse as possible. The project could

thus lead to the learning of how to develop the evaluation process in different types of occupations.

Table 1 presents the list of occupations selected by the committee, the number of persons employed in each in 1970 and the number of two-year institutions offering corresponding college curricula in 1970.

*Questions Investigated by the Task Forces*

The general role of the task forces was to gather, discuss and interpret various kinds of information concerning the needs and resources available for competency assessment in their field. The task forces researched the needs, determined whether established procedures for evaluating occupational competency are appropriate and decided whether additional assessment procedures are required in the field. Figure 1 presents a flowchart representing the process followed by each task force in evaluating an occupational field.

TABLE 1

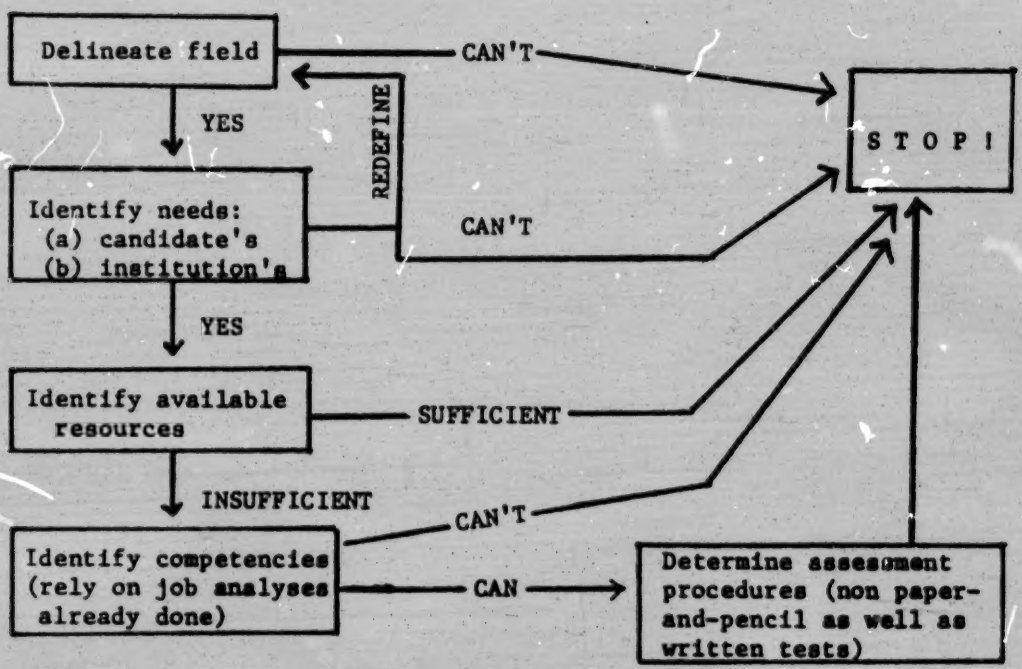
Number of Workers Employed in Eight Occupational Fields and Number of Junior Colleges Offering Programs in the Fields.

| OCCUPATION | NO. OF PERSONS EMPLOYED[a] | CORRESPONDING COLLEGE PROGRAMS | NO. OF JUNIOR COLLEGES OFFERING PROGRAMS[b] |
|---|---|---|---|
| Secretarial | 3,504,000 | Secretarial | 640 |
| | | Stenography | 310 |
| | | Typing | 6 |
| Accounting and Bookkeeping | 1,340,000 | Accounting | 530 |
| | | Bookkeeping | 360 |
| Mid-Management: wholesale and retail trade | 2,000,000 | Mid-Management Retailing | 300 |
| | | Mid-Management Merchandising | 260 |
| Law Enforcement | 415,000 | Law Enforcement | 390 |
| Data Processing | 400,000 | Data Processing: | |
| | | Computer Operator | 220 |
| | | Computer Programmer | 380 |
| | | Unit Record Operator | 160 |
| Electrical and Electronic Technology | 205,000 | Electrical Technology | 150 |
| | | Electromechanical technology | 650 |
| Day Care | | Child Care Technology | 30 |
| | | Nursery School Personnel | 75 |
| Agribusiness | | Agribusiness-management | 150 |
| | | Agribusiness-sales and service | 120 |

[a] From *Occupational Employment Statistics, 1960-1970*, Bureau of Labor Statistics, U.S. Department of Labor, Bulletin 1738, 1972.

[b] From *American Junior Colleges*, E. J. Gleazer (Ed.), American Council on Education, 1971.

FIGURE 1




An outline listing specific questions under each of the major activites given in the flowchart was provided to the task forces as a guide for their discussion and research. The outline is presented on the following pages.

## OUTLINE FOR TASK FORCE MEETINGS

I. *Delineate Field*

A. Identify structure of the field.

1. What are the major topics and subtopics?
2. Which occupations exist in the field?

B. Indicate related disciplines which are not subsured in the field.

C. Project the future outlook for the field.

II. *Identify Needs*

A. Institutional needs.

1. To what extent do postsecondary institutions need instruments for placement of their students majoring in the field?
2. To what extent do postsecondary institutions perceive a need to encourage the enrollment of persons with work experience?
3. How much degree credit would postsecondary institutions be willing to grant to occupationally competent individuals?
4. Are any institutions currently granting credit? On what basis is credit given?
5. Would postsecondary institutions be willing to financially support the development and administration of occupational assessment procedures?

B. Individual needs.

1. How many experienced individuals are there in the field who would like to pursue higher education?
2. How many individuals would take competency examinations if they could be given degree or certificate credit for their work experience?
3. How much would candidates for credit be willing to pay to take the examinations?

C. Needs of business/industry and labor.

III. *Identify Available Resources*

A. Which tests are currently available for measuring competency? What is their volume?

B. How appropriate are the tests in meeting the needs identified?

IV. *Identify Competencies*

A. What kinds of knowledges, skills, and abilities need to be assessed?

V. *Determine Assessment Procedures*

A. Are currently available tests sufficient in meeting the needs identified and in measuring the necessary knowledges, skills, and abilities?

B. Which tests look most promising and how should they be made available to candidates and colleges?

C. What other kinds of assessment techniques should be developed and what approach should be used to develop them?

1. Paper-and-pencil tests
2. Performance tests
3. Non-test measures - e.g. checklists and portfolio evaluation

D. How much emphasis should be given to assessing knowledge of theory?

E. Could the same instrument or procedure serve multiple purposes?

1. Credit or placement
2. Selection

3. Program evaluation
4. Certification
5. Other

VI. *Suggest Procedures for Implementation*

A. What are the political implications?

1. Policy board or advisory group
2. Role of professional associations

B. Who would fund initial development?

1. Manpower to conduct work
2. Administration of the tests

C. Which marketing strategies should be followed?

The results of the work of each task force is described in individual position reports which attempt to answer the foregoing questions raised by the Advisory Committee and discuss various issues relating to the assessment of occupational competency. The reports were reviewed by the Advisory Committee which used them to develop recommendations for the implementation of assessment programs. Since the individual position reports of the task forces describe the findings and conclusions of the research in detail, no attempt is made here to describe the reports in a comprehensive manner.[1] Instead, the reports are summarized and the general conclusions drawn from them by the Advisory Committee are described.

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[1] The position reports are available from the ERIC Documentation and Reproduction Service under the following title:

Bergquist, W. H.; Jones, J. Q.; Kroll, A. M.; and Sharon, A.T. Exploring the needs for competency measures in eight occupational fields: Position reports of task forces. TM003818

## SUMMARY OF TASK FORCES' FINDINGS

### *Delineation of the Occupational Fields*

The task forces varied in their success in formulating a clear definition of their respective fields and in delineating the occupational structure within each field. Among the fields where there is a clearly defined curriculum and job structure were Data Processing, Electronics Techology[2], Secretarial Science, and Accounting. Somewhat less well-defined are the fields of Police Science and Management. In Police Science there is a wide range of subject matter being taught at different junior colleges. The definition problem in Management is that the field is too broad, cutting across different fields such as financial, personnel, sales, and systems management. The two least well-defined fields are Agribusiness and Day Care. Because Agribusiness is such a broad term encompassing occupations ranging from agricultural economics to pesticide control, the task force decided to limit the definition of the field to "Farm and Ranch Management." Day Care is an emerging field which is currently undergoing formal definition and structuring by the federally-sponsored Child Development Associate (CDA) consortium.

Although the eight fields differ widely in the number of persons currently employed, most of them have good prospects for growth in employment. The field of Accounting will grow because of the expected

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[2] The field of Electronics Technology was redefined by the task force to include Electrical Technology

increase in governmental regulations and reports and more complex tax laws. Growth in Electronics Technology will come about by the increased sophistication of modern electronics equipment and processes. The outlook in Data Processing is bright because of the proliferation of minicomputers which will require large numbers of personnel for their operation and maintenance. The major trend in the Law Enforcement field is increasing professionalization of police and greater emphasis on degrees. The Day Care field is rapidly expanding as a result of increased numbers of mothers in the work force, increased emphasis on early childhood education, and new modes of federal support for day care facilities. On the other hand, the outlook for Farm and Ranch Management is cloudy because the entire agricultural industry is affected by a wide variety of unpredictable factors. There is likely to be a reduction in the total labor force as a result of automation in this field.

*Institutional Needs for Assessment*

Data concerning institutional needs for measures of occupational competency were gathered in a CEEB-WICHE survey of community colleges in 1972. A total of 225 colleges in 11 states responded to a questionnaire requesting information on the extent of need for vocational-technical competency examinations (see Appendices C and D). The questions and responses were as follows:

- Is there a need for competency assessment in occupational fields? (77% responded affirmatively)

- Would the institution be willing to devote manpower to develop occupational competency examinations? (60% responded affirmatively)
- Would the institution grant credit on the basis of occupational competency tests? (80% responded affirmatively)
- Would the institution employ teachers certified in part on the basis of occupational competency tests? (80% responded affirmatively)
- In which areas is there the greatest need? (The five areas mentioned most frequently were: general secretarial services, auto mechanics and related fields, industrial electronics, trade and industrial occupations, business and technical services.)

The foregoing results strongly suggest that postsecondary institutions feel that there is a need for standardized measures of occupational competency.

The need for occupational competency measures by higher education institutions is also revealed in the task force reports. One of the common themes emerging from the reports is that there is great interest by colleges in assessing the knowledge and skill gained through work experience which is similar to the knowledge and skill taught in the curriculum. The need for assessment, however, appears to be limited to off-campus experiences which overlap with the curriculum rather than all of the cognitive, psychomotor and attitudinal competencies gained from work experience.

Two of the task forces, Police Science and Child Care, conducted surveys of postsecondary institutions to find the extent of correspondence in the abilities developed in collegiate settings and those developed on the job. The results of these surveys suggest that there is a considerable overlap between the tasks performed by persons employed in the field and the skills taught in the curriculum, at least in these two fields. The areas of overlap would be the primary targets for formal assessment procedures to translate work experience into academic credit.

Another common finding of the task forces is that many colleges are currently granting credit for job-related experience using a variety of formal and informal assessment techniques. Among the techniques used are final course examinations, subjective reviews of work experience, national achievement examinations, interviews, and locally developed written or performance examinations. Although it is difficult to evaluate the reliability and validity of most of these techniques, it is clear that they do not meet the existing assessment needs. The task forces found that many of the national standardized examinations in the field are limited in their ability to establish equivalency between knowledge gained on the job and curriculum content. It could be speculated that many of the informal and subjective assessment techniques are even less appropriate for accomplishing a fair conversion of work experience into degree credit. Thus, there appears to be a clear need by postsecondary institutions for better competency assessment procedures.

The need for valid instruments and procedures for granting academic credit appears to be clearer in some of the fields than others. Clear needs exist in Data Processing, Electronics Technology, Accounting, Secretarial Science and Police Science. The needs in Management are clouded because the field is ill-defined. The need in Day Care is also questionable because of the emergence of a new national credentialing procedure for day care personnel. The field with the least need appears to be Farm Management. Although educational institutions vigorously promote continuing education in this field, there is very little emphasis on formal academic credit and degree programs.

*Individual Assessment Needs*

The question of individual needs relates to whether there are substantial numbers of non-degreed persons who have acquired job proficiency in an informal or non-traditional manner and desire to receive credit and placement in pursuit of a certificate or a college degree. Since it is difficult to respond to this question directly, the task forces explored several related questions: How many individuals are working in the field? How many currently hold degrees? How important is a certificate or a degree for employment, promotion, and salary increases? Which specific occupations or levels within the field should be targeted for occupational competency assessment?

*Day Care.* In theory, the Day Care field has the largest number of persons who have the potential to receive credit for their life experiences. Presumably, one need not have day care setting experience in order to be credentialed--any experienced parent who has raised his or her own children may be qualified for credit. The focus in the field should be placed on the middle-level day care worker, i.e. the teacher, and to a lesser extent, on the aide or manager. The fact that the mean educational level of day care workers is at the 10th grade level suggests that many such workers might desire college crediting arrangements if there is an increasing demand for professionalization in the field.

*Secretarial.* The Secretarial field is the largest of the eight fields in terms of the number employed. There are approximately 3.5 million secretaries, most of whom do not have college degrees. The availability of competency measures in the field is likely to encourage some secretaries to pursue college level courses and provide an incentive to move up the career ladder.

*Management.* Another large field in terms of the number of employed is that of Management. It is estimated that there are more than two million managers currently in the work force. The strong pressure for college degrees by many employers should encourage many of the non-degreed individuals in the field to enroll in higher education and seek credit for work experience.

*Accounting.* There are approximately 1.3 million accounting clerks and bookkeepers. Because the Bachelor's degree serves as the entry credential for the professional accountants, many individuals working in the field would be motivated to pursue higher education. Primary attention should be given to the non-degreed junior accountant rather than the bookkeeper or accounting clerk.

*Police.* There are over 400,000 workers in Law Enforcement. Because of the increasing professionalization of the field, many policeman are encouraged to enroll in formal Police Science programs with tuition reimbursement frequently offered as an inducement. Since an increasing number of police agencies are making college training a prerequisite for promotion, policeman are generally hardpressed to find time for attending classes and are likely to welcome any procedure that will reduce the period of time required to obtain a degree.

*Data Processing.* There are approximately 400,000 computer operators and programmers and they make up the bulk of workers in the Data Processing field. Since a significant proportion of current and future data processing workers will not have degrees, opportunities for continuing education are likely to be sought. The focus in this field should be on programmers and systems analysts rather than on keypunchers and machine operators.

*Electronics Technology.* The fields of Electronic and Electrical Technology account for about 200,000 workers. Only one out of four persons currently working in the field has two or more years of postsecondary education. Many of the technicians who have been trained in off-campus settings such as industry, military service, corporate or technical school and correspondence school are likely to desire formal recognition for their job competency.

*Other Assessment Needs*

It was pointed out earlier that the Advisory Committee recommended that the major focus of this study should be on how occupational competency measures could be used to grant experienced individuals academic credit. Several of the task forces, however, identified and focused on other kinds of needs for occupational competency measures in their fields.

*Selection.* One of the other assessment needs identified in the fields of Management, Electronics Technology, and Data Processing is selection of workers for employment purposes. Employers want to maximize the probability that a worker will succeed on the job and they would benefit from a procedure which would differentiate among job applicants on the basis of their skills and job knowledge. Job-related measures developed on the basis of job analysis will aid employers in selecting the best qualified applicants.

*Upgrading.* Another assessment need identified in the fields of Data Processing and Electronics Technology deals with the need to upgrade the technical capability of the current practitioner. Since both of these fields are changing rapidly, the skills of many workers are becoming obsolete. There is a need to encourage workers to pursue continuing education opportunities. One way to accomplish this is by a self-assessment procedure whereby individuals would assess their knowledge and competency in comparison with their peers or against some established criterion of basic competency. Presumably workers would be motivated to improve those skills or areas in which they are weak.

*Certification.* A common assessment need across most of the fields is to identify and formally recognize (by means of certification) those persons working in the field who have achieved a high level of competence. All of the fields with the exception of Law Enforcement and Farm Management currently have certification procedures conducted by the professional Associations.[3] These certification programs are primarily for the benefit of employers, the public, and the worker (who achieves professional status, a salary increase, or a promotion). Only in the Secretarial field is the certification procedure specifically recommended by the National Secretaries Association for use by colleges and universities to grant academic credit to secretaries who passed the certification procedure.

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[3] In the Day Care field the federally-sponsored CDA consortium is promoting a national certification program for all mid-level day care personnel.

*Available Instruments and Procedures*

Although there are a variety of standarized achievement examinations corresponding to most of the fields explored, only very few meet the need to assess an individual's occupational competency for the purpose of awarding college credit. Most of the available examinations are at an inappropriate level, are not structured to fit the college curriculum and cover dated material.

*The College-Level Examination Program (CLEP)*, a national program of placement and credit by examination, offers equivalency examinations in several of the fields explored in this study. The CLEP Subject Examination in Accounting was judged by the task force to contain language too greatly oriented towards the formal college curriculum. The examination may therefore be unfair to the non-traditionally educated person who uses a different vocabulary on the job. The two CLEP examinations in the Data Processing fields (Elementary Computer Programming: Fortran IV and Computer and Data Processing) were felt to be somewhat dated. There are several CLEP examinations in Management but the task force did not evaluate their appropriateness in awarding credit to experienced individuals.

*The National Occupational Competency Testing Institute (NOCTI)* administers written and performance examinations in 24 major occupations. The written test emphasizes knowledge gained from the job and covers the technical knowledge, understanding of principles and problem-solving abilities. The performance test enables the

candidate to demonstrate his skills in performing tasks typical of the occupation. The major purpose of the examinations is to grant academic credit to competent tradesmen who desire to become vocational teachers by enrolling in industrial teacher-training institutions. Of the eight fields explored in this study only the field of Electronics Technology overlaps with the NOCTI examinations. There are tests in Industrial Electronics, Industrial Electrician, and Electronics Communications. The task force felt that these tests are too broad for granting credit for a specific course.

*Certification Examinations.* Five of the eight occupational fields have certifying agencies which administer achievement examinations as part of the certification process. In the Secretarial field there is the Certified Professional Secretary (CPS) examination administered by the National Secretaries Association. Although there are about 50 colleges which are currently awarding credit for satisfactory performance on this examination the task force felt that there is a need to develop a parallel examination at a lower level.

As far as is known, the certification examinations in the other fields are not used by colleges for awarding credit and do not appear to be appropriate for this purpose with the possible exception of the CDA program in day care which is being developed in close cooperation with academic institutions. In data processing there are the Certifi-

cate in Data Processing Examination and the Qualified COBOL Programmer's Examination which are administered by the Institute for the Certification of Computer Professionals. In Electronics there is an achievement-type examination called Electrical-Electronics Technology administered by the Institute for the Certification of Engineering Technicians. In Management there is the Certified Administrative Manager Examination administered by the Administrative Management Society. There are several certification programs in Accounting including the well-known Certified Public Accountant (CPA) Examination (which the task force felt to be inappropriate for the objectives or target population of this study), the American Institute of Certified Public Accountants Examination, the Certified Internal Auditor Examination and the Certificate in Management Accounting Examination. There are no national certification programs in the fields of Police Science and Farm Management. In Day Care a new performance-based certification procedure is being initiated by the CDA consortium.

The foregoing list of examinations reviewed by the task force is not exhaustive. It represents some of the major standardized achievement examinations available in the fields. It was the general conclusion of the task forces and the Advisory Committee that the available examinations do not meet the need to award degree credit to individuals with work experience and that additional development of instruments and techniques to assess competency are required.

*Competencies Requiring Assessment*

The kinds of competencies that should be assessed have proven to be one of the more challenging and troublesome questions for the task force and the Advisory Committee. Job experience results in many different kinds of competencies--cognitive, psychomotor and affective--all meriting serious consideration in assessment. The practical limitations of measurement technology, however, must preclude the assessment of some of the important competencies.

All task forces agreed that job-related knowledge is an essential competency which should be assessed. There was less agreement, however, on the need to measure performance-based competencies, i.e. skills rather than knowledge. A need to measure actual performance was felt to be important in the fields of Day Care, Police Science, Secretarial and Electronics Technology.

The Advisory Committee discussed extensively the role of attitudes and values in job success because a need for the assessment of these kinds of competencies was found in the fields of Day Care, Police Science and Secretarial Science. Since postsecondary institutions attempt to impart attitudes and specific orientations to their students in addition to job-related knowledge, it is reasonable to assume that these kinds of competencies whould merit academic credit. The problem is that the state-of-the-art of attitude measurement has not reached the point where a valid assessment of attitudes

can be made. First, it is frequently impossible to specify exactly the kinds of attitudes required in an occupation. Second, most attitudes are difficult to assess objectively partly because responses are easily falsified on attitude scales or questionnaires.

The Advisory Committee concluded that assessment should be limited to those competencies which are gained through work experience, are taught formally in the college curriculum and are measureable. No attempts should be made to measure all of the knowledge, skills, abilities, and attitudes that result from work experience. It follows from this conclusion that prior to the development of any occupational assessment procedure there is a need to identify the content overlap or correspondence between the college curriculum and work experience in the field and to ascertain that reliable and valid instruments could be developed for such an undertaking.

*Proposed Assessment Procedures*

A variety of assessment techniques has been proposed by the task forces to measure the relevant competencies identified in each field. These techniques include paper-and-pencil tests, performance tests, situational exercises, and self-assessment techniques.

*Written objective examinations* or paper-and-pencil tests have been found to be most appropriate for the measurement of job-related knowledge. They are amenable to the measurement of the knowledge of the vocabulary, practices, and principles of an occupation as

well as the knowledge of how to apply the principles. They are relatively low in cost and frequently correlate highly with more expensive non-paper-and-pencil procedures. They cannot measure skills such as manipulating equipment, interacting with clients or solving problems which are difficult to simulate in a written format.

*Work samples and performance tests* have been proposed in the fields of Secretarial Science, Farm Management, and Electronics Technology. These tests enable the candidate to demonstrate his application of knowledge and his skills such as preparing a filing system and troubleshooting electronics equipment. Performance testing is important because an individual who has theoretical knowledge may not know how to apply it. One disadvantage of standardized performance testing on a national basis is the high cost relative to paper-and-pencil examinations. Performance tests require a high examiner-examinee ratio, expert evaluators and special instruments and equipment. The Electronics Technology task force recommended that individual colleges develop their own performance testing procedures rather than rely on national examinations because electronic equipment is not standardized and the examinee who is not familiar with a particular brand or make of an instrument may be at a disadvantage. Specific guidelines to developing such examinations on a local basis would be useful to postsecondary institutions.

*Situational exercises* are another major category of assessment procedures proposed in the fields of Day Care, Police Science, Accounting, Secretarial Science, and Management. These exercises simulate the work situation and allow the candidate to assume a specific role and work on the kinds of problems that actually occur on the job. The in-basket test is a good example of this type of assessment. The examinee is asked to work on a set of problems in a specific time period and to carry out certain actions such as make and communicate decisions, give directions, respond to requests and ask for information to solve problems. Another kind of situational exercise makes use of television and videotape. A specific situation is dramatized and the examinee is required to indicate how he would respond to the situation. A third kind of exercise is written simulation which confronts the candidate with a realistic problematic situation that requires a sequence of inquiries, decisions, and actions. Other types of situational exercises include management games, leaderless group discussion, interview simulation or role playing, computer simulation, stress interview, peer rankings, and the case study method.

*Self-assessment techniques* are a fourth major category of assessment procedures proposed in the fields of Police Science, Day Care, and Electronics Technology. An example of this kind of technique is the job inventory whereby the candidate indicates in some detail the type and extent of job activities he has performed that are related to the field being assessed.

The four foregoing types of assessment can be elaborated further by focusing on the recommendations of the Day Care task force which described six alternative assessment models for the field of child development:

1. The *performance-based* model involves placing the candidate in a simulated situation or observing him in a natural situation;
2. In the *contract-based* model the candidate contracts with an advisory committee to accomplish a certain type and amount of learning and must produce evidence that he has met the terms of the learning contract;
3. The *knowledge-based* model involves assessment by traditional written objective examinations such as the CLEP examinations;
4. The *job inventory* model requires the candidate to document his experience on the basis of a detailed job inventory that is validated by previous supervisors;
5. The *transfer* model allows for the transfer of credit for formal but off-campus experiences which involve training programs similar to those offered by collegiate institutions;
6. The *exchange* model allows for the taking of courses at one institution and receiving credit for them at another institution.

*Implementation of Assessment Program*

One of the major common themes in the task force recommendations for implementation is that the professional associations representing the practitioners in the field should be involved in the development of a nationwide assessment program. Four such associations mentioned by the task forces included the Institute for the Certification of Computer Professionals, Child Development Associate Consortium, National Secretaries Association International, and the Institute for Electrical and Electronic Engineers.

Although several of the task forces limited their recommendations to general approaches to implementation of a nationwide assessment program, others were quite specific in their advice. The Police Science task force recommended that a feasibility study be conducted and performance objectives and task inventory be completed prior to the development of any assessment procedures. Subsequently, the assessment procedures, which would include paper-and-pencil tests, performance-based tests, and job inventory would be pilot-tested in three states.

The Electronics Technology task force identified four high priority areas in the field in which written objective examinations should be developed. The examinations would be pretested, normed, and validated at a representative sample of colleges.

In Data Processing, a number of issues will require further consideration before the final implementation of an assessment program. Some of these issues include: (1) Which competencies need to be assessed? (2) Are present job analyses in the field adequate for test development? (3) What is an adequate standard of test performance?

The Day Care task force recommended that the six assessment models described earlier be fully developed and described in a publication on alternative approaches to crediting occupational experiences. This publication should be made available at low cost to persons in the field.

## CONCLUSIONS AND RECOMMENDATIONS OF ADVISORY COMMITTEE

### *Needs and Approaches to Occupational Competency Assessment*

The Advisory Committee reviewed each of the task force reports and at their final meeting drew the following general conclusions concerning the needs and approaches to occupational competency assessment programs for postsecondary education:

1. Occupational competency measures can serve as incentives for individuals to advance their personal and career growth and raise the professionalism in a field;
2. Occupational competency measures for postsecondary institutions should be developed primarily for the purpose of translating work experience into degree credit but such measures should be useful in other ways such as guidance, placement, and end-of-course achievement measurement;
3. The content of occupational competency measures should be based upon the content overlap between the curriculum and experience on the job and should correspond to the courses within the curriculum;
4. Occupational competency should be assessed
   a. by multiple approaches rather than a single assessment procedure
   b. at multiple levels of proficiency
   c. by measuring multiple competencies such as knowldege, skills, and attitudes

d. by instruments which emphasize as much as possible the vocabulary and procedures employed on the job

5. Occupational competency measures should provide diagnostic feed-back to the candidate to help him identify his strong and weak skills;

6. Professional associations and postsecondary institutions should be closely involved in the development of occupational assessment techniques and programs.

*Implementation*

The Advisory Committee considered the eight fields in terms of priority for implementing the recommendations of the task forces. Two levels of priority were established--those fields where implementation should begin immediately and those fields that should be held in abeyance. There was substantial agreement that implementation of the task force recommendations should begin in the fields of:

Data Processing
Electronics Technology
Police Science and
Secretarial Science.

The committee selected these fields primarily on the basis of the clear need for occupational competency measures as established by the task forces. If implementation of assessment programs in these four fields is successful, then attention could be focused on the

other four fields:

Accounting

Agribusiness

Day Care and

Management.

Implementation of an assessment program in each of the fields should be a cooperative effort by postsecondary institutions, professional associations and a professional testing agency. In each field a consortium of pacesetter institutions and professional associations would implement the recommendations of the task forces relying on a professional testing agency for operational support. There would be no formal links between the four consortia but communication lines would be maintained by the testing agency so that assessment methodology developed in one field could be applied to the others. Funding for the planning, development, and administration of the assessment programs should be sought from government agencies or private foundations with interest in manpower utilization and assessment of experiential learning.

The next logical steps in implementing the recommendations of the Advisory Committee might be as follows:

1. The project's staff will publicize the findings of the study by preparing articles for journal publication and by the submission of all reports into the ERIC Clearinghouse system;

2. ETS will encourage the setting up of planning conferences by key agencies and postsecondary institutions in each of the four top priority fields identified by the Advisory Committee. Task force members who have expressed interest in continuing to work on the project will also be encouraged to participate in the conferences;
3. It is hoped that consortia of professional associations and postsecondary institutions will be formed as a result of the initial conferences. ETS would be willing to cooperate with the consortium in each field and, if requested, to prepare proposals for development and validation of assessment procedures and submit them to an appropriate agency or foundation for funding;
4. If funding is obtained, then test and other instrument development could proceed under the policy direction of the consortia. The developmental work should be a cooperative effort between measurement specialists and subject matter experts in the field;
5. The assessment procedures, once developed, should be field-tested at a representative sample of postsecondary institutions, normative data would be collected and procedures established to determine equivalency between work experience and the kind and amount of degree credit.

6. The assessment services would be most useful if they could be offered by the consortia on a nationwide basis to individuals who desire to receive degree credit for their occupational competence. The actual operation and maintenance of the assessment programs at a high quality level should be the responsibility of a professional testing agency working under the policy direction of the consortia.

## EVALUATION OF PLANNING PROCESS

The planning process employed in this study involved a cooperative effort by teams of experts who worked as task forces in various occupational areas. These task forces were guided and supported in their research and deliberation by an Advisory Committee of occupational educators and by the staff of the three participating organizations, including several measurement specialists.

It was the opinion of the Advisory Committee and the staff that the procedure used in this study was generally successful in identifying the needs for occupational competency assessment. The face-to-face interaction of experts with different viewpoints was an essential element of the project which could probably not be duplicated by other means of assessing need such as questionnaire surveys.

Although generally successful, the planning process had a number of disadvantages and problems. First, the concerns of the task forces were frequently much broader than the scope of the study. These concerns sometimes had a direct bearing on the questions raised in the study but frequently tended to cause the discussion to stray from the issue of interest. Second, the task forces were too small to represent all viewpoints in the field. Perhaps fewer fields could have been explored in greater depth using a larger number of consultants. Third, the time between the first and second meetings of the task forces was not long enough for adequate data collection. Finally, members of the Advisory Committee somehow

should have been more deeply involved in the "nuts and bolts" activities of the task forces possibly by participation in the task force meetings. Unlike the task force members who were all interested in the same field, the Advisory Committee members had little in common except an interest in occupational education.

# APPENDIX A

## NAMES AND AFFILIATIONS OF ADVISORY COMMITTEE MEMBERS

Lee Cavner
Supervisor
Guidance & Job Development
State of Colorado Board for Community
Colleges and Occupational Education

Robert Childs, Captain
Chief, Civilian Agencies Branch
Community College of the Air Force

Harry Davis
Supervisor
Trade & Industrial Education
Ohio State Department of Education

Daniel H. Malia, Coordinator
Vocational-Technical Education
Newton Public Schools, Massachusetts

James H. Ricks
Associate Director of Test Division
Psychological Corporation

John A. Sessions
Assistant Director of Education
AFL-CIO

John J. Swalec
Associate Secretary
Illinois Junior College Board

## APPENDIX B

## NAMES AND AFFILIATIONS OF THE TASK FORCE MEMBERS

*Data Processing*

John J. Dineen
Chairman of Computer Science
Middlesex County College, New Jersey

Marc A. Goldberg
Manager of Education
Control Data Institute

Fred H. Harris
Director of the Compucation Center
University of Chicago

Jerry L. Houston
Education Consultant
IBM Corporation

*Day Care*

Roberta
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James Hennes
Office of P[illegible]valuation
Departmen[illegible]tion
Denver, Co[illegible]

Shahbaz Mallick
Campus Learning Center
SUNY--New Paltz, New York

Leroy M. Netrick
Southern Association of
Colleges and Schools

Joyce Threlkeld
Taylor Education Building
University of Kentucky

C. Ray Williams
Executive Director
CDA Consortium

*Police*

Wordie W. Burrow, Director
Academic Affairs
Texas Commission of Law Enforcement

Douglas Goodgame
Texas A & M University

Joel Greenfield
Northern California Criminal
Justice Training & Education System

Thomas Moore
Community College of Denver
Red Rocks Campus

David Sheppard
Denver Anti-Crime Council

*Secretarial*

A. Fred Friedman, Jr.
Vice President
Midland Federal Savings and Loan Association
Denver, Colorado

Jane Robshaw
Personnel Department
United Bank of Denver
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William Mitchell
Department of Office Adm. & Bus. Education
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Arlene Seaton, CPS
Texaco, Inc.

Marianne Stroo
American Express Company

Cynthia Brummond
Administrative Assistant
Department of Office Adm. & Bus. Education
University of Wisconsin--Eau Claire

*Secretarial - contd.*

Mary Pat Kennedy
Personnel Department
United Bank of Denver

*Agribusiness*

L. W. Davis
Evergreen, Colorado

John Mamer
Department of Agricultural Economics
University of California, Berkeley

Richard W. Schermerhorn
Department of Agricultural Economics
University of Idaho

John Wubben
Colorado Mountain College

*Management*

C. Glenn Bjustrom, C.A.M.
Director of General Services
Colorado Interstate Corporation

John V. Cassidy
Director of Travel & Recreation Management
Mesa College, Grand Junction, Colorado

Louis Graziano
Assistant Professor
Business Education
Eastern Michigan University

William T. Lutz, C.A.M.
Manager, Office Services
Trunkline Gas Company
Houston, Texas

F. Arnold McDermott
Career Service Authority
City and County of Denver
Colorado

*Accounting*

Clyde Kobberdahl
Department of Business Technologies
Cincinnati Technical College

Roger DeVries
Capitol Life Insurance Company
Denver, Colorado

Ronald Walters
Community College of Denver--North Campus

R. W. Strain, Supervisor
Joint Interest Accounting
Chevron Oil Company

Edward Rettig
Director of Purchasing
Jacobs Equipment Company
Denver, Colorado

*Electrical/Electronics Technology*

Joseph B. Aidala
Chairman, Department of Electrical Technology
Queensborough Community College
New York

Ralph M. Caldwell
State Supervisor of Technical Education
State Education Department, Mississippi

Dennis L. M. Irion, Captain
Head, Electro-Mechanical Careers Branch
Community College of the Air Force

Merton Jacobs
General Motors Institute

William M. O'Hara
Manager, Personnel Practices
General Electric Company

# APPENDIX C

## STAFF OF THE PROJECT

*Educational Testing Service*

Arthur M. Kroll
Director of Guidance Programs

Carol A. Kennedy
Secretary

Adolf Panitz
Director
National Occupational Competency Testing Institute

Benjamin Shimberg
Director of Program Development

Amiel T. Sharon
Associate Program Director

*College Entrance Examination Board*

Phyllis M. Holec
Secretary

J. Quentin Jones
Assistant Director

*Western Interstate Commission for Higher Education*

Lucia Aylesworth
Research Assistant and Secretary

Mary Besse
Secretary

William H. Bergquist
Director
Special Higher Education Programs

## APPENDIX D

### SURVEY OF VOCATIONAL-TECHNICAL COMPETENCY EXAMINATION NEEDS

1. In your opinion, is there a need for the development of standardized, uniform competency (proficiency) examinations in the vocational and technical fields of study?

   _____ Yes _____ No

2. If yes, would you indicate in order or priority which areas are most in need of such examinations?

   _____ _____

   _____ _____

   _____ _____

3. Would your institution be willing to contribute the time and expertise of one or more of your instructors to work on the development of a national competency examination?

   _____ Yes _____ No

4. At this time can you indicate, by name, the member or members of your instructional staff who would be given released time to work with others in the development of proficiency examinations?

   _____ _____

   _____ _____

   _____ _____

5. If such examinations were developed and made available nationally, would your institution:

   A. Grant degree credit for satisfactory performance?

      _____ Yes _____ No

   B. Employ teachers whose certification included credit generated through such examinations?

      _____ Yes _____ No

---

Name and Title: _____

Institution: _____

City, State, Zip: _____

Telephone: _____

# APPENDIX E

## RESULTS OF SURVEY TO DETERMINE VOCATIONAL-TECHNICAL COMPETENCY EXAMINATION NEEDS

April 5, 1972

| | BASE DATA | | ALL COLLEGES RECEIVED (Enrollment = 4,532) | | | | | | COLLEGES ENROLLING 4,532 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 Total # Colleges in ea. State | 2 Total Enrollment All Colleges | 3 Total College Responses Received | 4 Enrollment at all Responding Colleges | 5 Question 1: Is there a need? Yes | 6 Question 3 Would you give time? Yes | 7 Question 5a Grant Credit? Yes/Maybe | 8 Question 5b Hire Faculty Yes/Maybe | 9 Total College Responses = 4,532 | 10 Enrollment at all Responding* Colleges 4,532 | 11 Question 1 Yes | 12 Question 3 Yes | 13 Question 5a Yes/Maybe | 14 Question 5 Yes Maybe |
| | | | % = 3/1 | % = 4/2 | % = 5/3 | % = 6/3 | % = 7/3 | % = 8/3 | % = 9/3 | % = 10/4 | % = 11/9 | % = 12/9 | % = 13/9 | % = 14 |
| California | 91 | 715,307 | 56 (62%) | 458,545 (64%) | 40 (71%) | 30 (54%) | 39/11 (70/89%) | 40/10 (71/89%) | 55 (61%) | 418,365 (91%) | 24 (69%) | 15 (51%) | 24/9 (69/94%) | 25/8 (71/94%) |
| Florida | 27 | 120,845 | 21 (78%) | 92,708 (77%) | 18 (86%) | 10 (47%) | 16/4 (76/95%) | 15/4 (71/90%) | 5 (24%) | 60,108 (65%) | 5 (100%) | 5 (100%) | 4/1 (80/100%) | 4/1 (80/100%) |
| Idaho | 2 | 3,048 | 2 (100%) | 3,048 (100%) | 2 (100%) | 2 (100%) | N.A. | N.A. | -- | -- | -- | -- | -- | -- |
| Illinois | 36 | 142,570 | 29 (81%) | 100,299 (68%) | 26 (90%) | 22 (76%) | 27/1 (93/97%) | 28/1 (97/100%) | 4 (14%) | 59,354 (59%) | 1 (100%) | 2 (50%) | 4 (100%) | 4 (100%) |
| Montana | 3 | 2,377 | 2 (66%) | 1,946 (82%) | -- | -- | 2 (100%) | 2 (100%) | -- | -- | -- | -- | -- | -- |
| New York | 42 | 184,421 | 34 (80%) | 145,883 (79%) | 31 (91%) | 19 (56%) | 30/3 (88/98%) | 30/3 (88/98%) | 10 (30%) | 93,795 (64%) | 6 (60%) | 3 (30%) | 4/1 (40/90%) | 6 (60%) |
| Oregon | 12 | 55,528 | 5 (42%) | 11,095 (20%) | 5 (100%) | 4 (80%) | 5 (100%) | 5 (100%) | -- | -- | -- | -- | -- | -- |
| Texas | 45 | 111,739 | 43 (100%) | 111,739 (100%) | 25 (58%) | 23 (53%) | 28/10 (65/88%) | 32/8 (74/93%) | 6 (14%) | 44,722 (40%) | 4 (66%) | 4 (66%) | 4/1 (66/83%) | 4/1 (66/83%) |
| Utah | 5 | 8,453 | 4 (80%) | 7,567 (90%) | 4 (100%) | 3 (75%) | N.A. | N.A. | -- | -- | -- | -- | -- | -- |
| Washington | 24 | 90,757 | 21 (88%) | 82,248 (91%) | 17 (81%) | 11 52% | 15/2 (71/86%) | 16/3 (71/86%) | 9 (43%) | 51,170 (62%) | 6 (66%) | 4 (44%) | 6/1 (66/77%) | 6/1 (66/77%) |
| Wyoming | 7 | 6,971 | 6 (86%) | 6,348 (92%) | 4 (66%) | 5 (83%) | N.A. | N.A. | -- | -- | -- | -- | -- | -- |
| TOTALS | 292 | 1,444,416 | 225 (77%) | 1,022,026 (71%) | 172 (77%) | 129 (57%) | 162/32 (72/86%) | 167/28 (74/87%) | 69 (30%) | 727,511 (71%) | 51 (74%) | 51 (74%) | 50/13 (72/91%) | 51/11 (74/91%) |

# APPENDIX F

## NAMES AND ADDRESSES OF RELEVANT ASSOCIATIONS IN THE FIELDS EXPLORED

*Accounting*

Institute of Internal Auditors, Inc.
5500 Diplomat Circle
Orlando, Florida 32810

National Association of Accountants
919 Third Avenue
New York, New York 10022

American Institute of Certified Public Accountants
AICPA Testing Project Office
The Psychological Corporation
304 East 45th Street
New York, New York 10017

*Day Care*

Child Development Associate Consortium
7315 Wisconsin Avenue
Washington, D.C. 20014

*Management*

American Management Society
135 West 50th Street
New York, New York 10060

Administrative Management Society
Willow Grove, Pennsylvania 19090

*Secretarial*

The Institute for Certifying Secretaries
National Secretaries Association, International
2440 Pershing Road
Suite G-10 Crown Center
Kansas City, Missouri 64108

*Electronics Technology*

Institute for the Certification of Engineering Technicians
2029 K Street, N.W.
Washington, D.C. 20006

Institute of Electrical and Electronics Engineers, Inc.
345 East 47th Street
New York, New York 10017

*Data Processing*

Institute for Certification of Computer Professionals
c/o Data Processing Management Association
505 Busse Highway
Park Ridge, Illinois 60068